

Studies on Trichoptera of Korea (North)

III. Superfamily Hydropsychoidea

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Abstract Faunistic and systematic data for 39 species (two left as sp.) belonging to six families of Hydropsychoidea are reported. One genus, *Paduniella* (Psychomyiidae), and 17 species from various families are reported for the first time from Korea; among them, 7 species are described as new to science: *Wormaldia* (W.) *coreana* sp. n., *W* (W.) *longicerca* sp. n. (Philopotamidae), *Stenopsyche variabilis* sp. n. (Stenopsychidae), *Paduniella martynovi* sp. n., *Psychomyiella myohyangsanica* sp. n., *P. cruciata* sp. n. (Psychomyiidae), and *Ecnomus tsudai* sp. n. (Ecnomidae). Female genitalia of some following insufficiently known species are originally illustrated: *Stenopsyche marmorata* Navas, *S. coreana* Kuwayama, *S. bergeri* Martynov, *Nyctiophylax hjangsanchonus* Botosaneanu, *N. angarensis* Martynov, *N. sp.*, and *Pseudoneureclipsis proxima* Martynov. Additional data to the morphology of males (including new genitalic drawings) of *Cheumatopsyche albofasciata* (McLachlan) and *Potamyia czezanowski* (Martynov) are also provided.

Key words faunistics, systematics, Trichoptera, Philopotamidae, Stenopsychidae, Psychomyiidae, Ecnomidae, Polycentropodidae, Hydropsychidae, Korea.

INTRODUCTION

The record of three *Stenopsyche* species by Kuwayama (1930) seems to be the first report of the superfamily Hydropsychoidea in the order Trichoptera from the Korean peninsula. Main sources of faunistic and systematic data on that matter are based on the publications of Tsuda (1940; 1942) and Botosaneanu (1970). A series of taxa on Hydropsychoidea has been also reported from South Korea by Kim (1974). Based on immature stages only, the latter paper is of less faunistic importance, and most of the determinations being left at generic level, as concerned the hydropsychids, the presence of *Cheumatopsyche brevilineata* Iwata in Korea should eventually be confirmed by the examination of adults.

Seven families of Hydropsychoidea are known in Korea so far. Twenty-seven species belonging to 13 genera have been reported there, and six of the species not established in the collections now studied (including *Arctopsyche palpata* Martynov, the only species of Arctopsychidae known from Korea). Instead, one genus and 17 species are now added to the check list of Korean Trichoptera, of them 7

species new to science. Thus, the recent list of the superfamily of Hydropsychoidea in Korean peninsula includes 44 determined species.

List of the localities*

Province Hwanghaenam-do (Southern Hwanghae)

- Loc. 1a: Haeju, 6.IV.1987 (leg. M. Josifov, P. Beron & Z. Hubenov = MJ, PB & ZH, at light).
 Loc. 1c: same place, 26-27.IX.1978 (leg. K. Kumanski = KK, at light).
 Loc. 2a: Mt. Sujang-san (small mountain near Haeju), ca. 300–500m alt., 28.VIII.1982, rhithral, with hygroptetric niches (leg. P. Beron & A. Popov = PB & AP).
 Loc. 2b: same place, 26-27.IX.1978 (leg. KK).

Kaesong city

- Loc. 4: Mt. Bagyŏn-san (ca. 20 km N. of Kaesung), mountain river below the waterfall of Bagyon, 21.V.1975 (leg. M. Josifov = MJ).
 Loc. 5: same mountain, Bagyŏn-pokpo (waterfall of Bagyŏn), 27 km N. of Kaesong, 7.VI.1970 (leg. S. Mahunka & H. Steinmann = SM & HS).
 Loc. 8b: Kaesong, inner city, 25.VIII.1982 (leg. PB & AP).

Province Kangweon-do

- Loc. 9a: Mt Kumgang-san., the foothills, near Gosong Hotel (ca. 50 m alt.), 2–3.X.1978 (leg. KK, at light).
 Loc. 9b: same place, 29-31.V.1970 (leg. SM & HS).
 Loc. 9c: same place, 18-20.VIII.1982 (leg. PB & AP, at light).
 Loc. 9f: same region, 100–900 m alt., 4.VI.1987 (leg. M. Josifov, P. Beron & Z. Hubenov = MJ, PB & ZH).
 Loc. 10: Stream and small torrents of the plain, 1–3 km from the sea (ca. 25 km E. of Wŏnsan), 6.X.1978 (leg. KK).
 Loc. 11: River Conchon, near Samthe vill. (ca. 8 km W of Wŏnsan), 6.X.1978 (leg. KK).
 Loc. 12: same region, streamlet above Samthe vill., left tributary of Conchon River, 6.X.1978 (leg. KK).

Pyŏngyang city

- Loc. 17a: Pyŏngyang, park Moran, artificial torrent, 28.IX.1978 (leg. KK).

*) Only those of the localities, where taxa of Hydropsychoidea were collected, are listed here; their numeration is after the general list of localities (Kumanski, 1990), with five new data from localities visited again in 1989 and 1990 (otherwise known): 18i, 18k, 29d, 29e and 31b.

- Loc. 17b: same park, 17.VIII.1982 (leg. PB & AP).
Loc. 18a: Pyöngyang, River Daedong, 28. IX.-7. X.1978 (leg. KK, at light).
Loc. 18b: same place, 17-29. V.1975 (leg. MJ, at light).
Loc. 18c: same place, 3.VIII.1977 (leg. MJ, at light).
Loc. 18d: same place, 12.VIII.1974 (leg. MJ, at light).
Loc. 18e: same place, 9.VI.1987 (leg. MJ, PB & ZH, at light).
Loc. 18f: same place, 5-17.VIII.1971 (leg. J. Papp & S. Horvatovich = JP & SH).
Loc. 18h: same place, 6-15.VIII.1982 (leg. PB & AP, at light).
Loc. 18i: same place, 26.VIII.1989 (leg. MJ & ZH, at light).
Loc. 18k: same place, 8.IX.~3. X.1989 (leg. MJ & ZH, at light).
Loc. 19b: Pyöngyang, Park Daesong, 5-23.VII.1974 (leg. MJ).
Loc. 19c: same place, 21. V.1970 (leg. SM & HS).
Loc. 19d: same place, 22.IX.1978 (leg. KK).

Province Pyöngannam-do (Southern Pyöngan)

- Loc. 24: The outflow of Dam Jongphung (left tributary of River Chöngchön-gang), ca. 200 m alt., 29.IX. 1978 (leg. KK).
Loc. 26: Mt. Ryöngak-san, 20. V.1975 (leg. MJ).
Loc. 28: River Daedong, Nung-ra-do (island), 14.VIII.1971 (leg. JP & SH).

Province Pyönganbuk-do (Northern Pyöngan)

- Loc. 29a: Mt. Myohyang the foothills (ca. 200 m alt.), Hotel, 22.V.1987 (leg. MJ, PB & ZH, at light).
Loc. 29b: same place, 8-12.VI.1987 (leg. MJ, PB & ZH, at light).
Loc. 29c: same place, 14-18.VIII.1982 (leg. PB & AP, at light).
Loc. 29d: same place, 29.VIII.1989 (leg. MJ & ZH, at light).
Loc. 29e: same place, 3-4.VII.1990 (leg. MJ & ZH, at light).

Province Ryangang-do

- Loc. 31b: Samjiyon, ca. 1100 m alt., 4.IX. 1989 (leg. MJ & ZH).

Province Hamgyöngbuk-do (Northern Hamgyöng)

- Loc. 38: Onpho vill. (district Zueul), 6.IX.1970 (leg. R. Bielawski & M. Mroczkowski).

SYSTEMATICS

Family Philopotamidae

Genus *Chimarra* Stephens

An unnamed species was reported from Korea by Kim (1974), but left unmentioned by Yoon (1988).

Chimarra tsudai Ross, 1956

Species new to Korea.

Material examined. Loc. 9b-1 ♂.

Distribution. Korea. Indonesia (Sumatra, Java), Taiwan, Japan.

Genus *Dolophilodes* Ulmer

Three species of two subgenera have been described by Botosaneanu (1970), two of them from N. Korea, and the third one from Japan. All the three have been established now. An unnamed species was also reported from S. Korea (Yoon, 1988).

Dolophilodes (Dolophilodes) mroczkowskii (Botosaneanu, 1970)

Material examined. Loc. 29a-2 ♂. This locality is close (if not the same) to one of the two (places) which the species was described from.

Distribution. Korea (North).

Dolophilodes (Kisaura) hapirensis (Botosaneanu, 1970)

Material examined. Loc. 5-1 ♂; Loc. 9a-2 ♂, 3 ♀ (cf. this species); Loc. 9b-1 ♂.

Distribution. Korea (North).

Dolophilodes (Kisaura) tsudai (Botosaneanu, 1970)

Species new to Korean peninsula.

Material examined. Loc. 2b-7 ♂, 8 ♀ (cf. this species); Loc. 5-2 ♂, 1 ♀ (cf. this species).

This species was described from Japan. It seems closely related to the other two representatives of subgenus *Kisaura* in Japan, i. e., *D. (K.) kisoensis* (Tsuda), and especially greatly resembling *D. (K.) niitakaensis* Kobayashi. The only difference between the latter and *tsudai* appears to be the absence of a single apical spine in the phallic apparatus, indicated for *niitakaensis* by Kobayashi (1980), otherwise I would consider these species conspecific, *D. niitakaensis* being a junior synonym of *D. tsudai*.

Distribution. Japan, Korea (North).

Genus *Wormaldia* McLachlan

This genus, well represented in Japan, was known in Korea only with an unnamed species (Yoon, 1988). Our investigations have resulted two new species, both belonging to the nominative subgenus.

Wormaldia (Wormaldia) coreana sp. n.

Colour (in alcohol) uniformly light brown. Length of forewing male, 5.0–5.7 mm, female 4.7–5.0 mm. Fork 4 in front wing developed, i. e., vein M_4 present. Seventh and 8th male sternites with distomedian processes, that on 7th sternite very long, nearly parallel-sided and obtusely truncate at apex, that on 8th sternite triangular, twice as short as previous one (Fig. 2).

Male genitalia. Distodorsal margin of 8th tergum straight. Segment 9th short, with its dorsal portion reduced. Viewed dorsally, segment 10th as a triangle, with its sides convex; laterally, its dorsal margin forming a very shallow, elongate saddle-shaped incision, terminating in a clear tip (Fig. 1). Cerci narrow, only a little shorter than 10th segment. Coxopodite stout, as long as high; harpago elongated, twice as narrow as coxopodite; the internal 1/3 of latter with numerous black, short setae. Phallic apparatus membranous, short, with one small internal spine (Fig. 3).

Material examined. Loc. 9a—Holotype male, 20 ♂ and 8 ♀ paratypes; Loc. 10—1 ♂, 1 ♀ paratypes; Loc. 29b—2 ♂ paratypes; Loc. 29c—1 ♂ paratype. A couple of paratypes from Loc. 9a deposited in collection of Dr. H. Malicky, Lunz am See, Austria; all the other types in author's collection.

Discussion. *W. coreana* sp. n. belongs to the group of *moesta* and is seemingly related to *W. chinensis* (Ulmer). These two species can be distinguished by the shape of the cerci and segment 10th, as well as by the probable absence of ventromedial processus on sternum 8th (or, on 7th ? this is not clearly indicated in the original description by Ulmer (1932)) in *W. chinensis*.

Wormaldia (Wormaldia) longicerca sp. n.

Colour (in alcohol) uniformly medium brown. Length of forewing male, 3.2–4.2 mm, female 3.7–4.0 mm. Fork 4, respectively vein M_4 , in front wings absent. Seventh sternum, male, with moderately elongated, narrow triangulate processus, 8th sternum with a short, broadly triangulate processus (Fig. 5).

Male genitalia. Distodorsal margin of tergum 8th with a deep, narrow cleft, forming a pair of acute and hairy lobes (Fig. 6). Segment 9th with long, rounded lateral projections on its proximal margin, reaching orad deeply into segment 8th (Fig. 4). Segment 10th, laterally, as thin, long plate with acute tip, dorsally a narrow triangle, with its tip rounded. Cerci straight, thin sticks, as long as segment 10th. Coxopodite an elongated rectangular; harpago 3/5 of the length of coxopodite, ovoidal, with a zone of black setae on the distomedial half. Phallic apparatus a very long, membranous tube, with its bulbous basal portion reaching orad as deep as into segment 7th; sclerotized armature of endotheque of three rods: a very long, single one, and a pair of much shorter rods, as well as of a strong, hooked spine, and another, faint, spine (Fig. 7).

Material examined. Loc. 2b—Holotype male, 12 ♂ and 15 ♀ paratypes; Loc. 9a—3 ♂ paratypes; Loc. 9b—1 ♂ paratype. A couple of paratypes from Loc. 2b deposited in collection of Dr. H. Malicky, Lunz am See, Austria; all the other types in author's collection.

Discussion. *W. longicerca* sp. n. differs from all the other species of subgenus *Wormaldia* by its characteristically shaped 9th and 10th tergites, claspers, the elongated cerci, and, *above all*, by the unusually elongated phallosome.

Family Stenopsychidae

Four species of this family were determined in the collections now studied, one of them seemingly new and the other three already known and found once again in Korea. In a fundamental revision of the family, Schmid (1969) established that *Stenopsyche griseipennis* McLachlan has been wrongly reported from all the regions except the Himalaya, Khasia Hills and Manipour. Further on, the same author (Schmid, op. cit.) has revised specimens from Ussuri, belonging in fact to *S. marmorata* Navas. Thus, the reports of *griseipennis* from Korea (Marthnov, 1926; Tsuda, 1942; Yoon, 1988) should namely concern *marmorata*. A special attempt in recognizing the females (so far remaining practically unknown) is also made here.

Genus *Stenopsyche* McLachlan

Stenopsyche marmorata Navas, 1920

Material examined. Loc. 9a—23 ♂, 14 ♀; Loc. 9b—1 ♀; Loc. 9c—21 ♂, 5 ♀; Loc. 29a—3 ♂, 3 ♀; Loc. 29c—1 ♂, Loc. 39—1 ♀.

Female genitalia. Figs. 18, 19.

Distribution. Korea, Eastern Palearctic, Taiwan.

Stenopsyche variabilis sp. n.

Colour pattern of *S. marmorata* type: forewings densely spotted with small, whitish spots; hindwings monotonous, hyaline. Somewhat smaller than *marmorata*, forewing length 15–18 mm. Spurs (♂, 0) 3, 4, 4.

Male genitalia. Latero-apical corner of 9th segment forming a short, but conspicuously pointed angle* (Fig. 8). Segment 10th deeply divided by a narrow cleft; intermediate appendages, surrounding it baso-laterally, strongly variable, from short and hairy digitiform processes (Figs. 14, 15), to almost entirely reduced ones, represented only by several small, irregular and often asymmetrical, setose tubercles (Figs. 9, 11, 12). Preanal appendages very long, straight, without particularities. Inferior appendages also without particularities as concerns their inferior arms. Superior arms of inferior appendages variable in shape: in general, their distal portions recurved externally at a right angle, forming strong hooks which usually (but not always) terminate in a single point (Figs. 9, 11, 12, 14,

*) Here and further, the terminology suggested by Schmid (1969) is used.

15). Phallic apparatus with semimembranous phallosome, and the endosoma bearing variable set (from 10 to 20) of strong spines (Figs. 10, 13).

Female genitalia. Segments 8th, 10th and 11th after the pattern common for the genus, specific characters in vaginal structures. Vulvar plate with rounded distal border, caudally projected beyond the hairy lateral corners (Figs. 16, 17); vaginal vestibule, viewed laterally, triangular, with elongate basal margin and rounded lateral margins; viewed ventrally, two long dark strips surround an elongate and narrow passage to vaginal chamber; latter with a pair of dark, not entirely symmetrical, semisclerotized structures, continuing orad after a sigmoidal bend (Fig. 17) into the long, membranous tube.

Material examined. Loc. 29a—Holotype male, 4♂ and 11♀ paratypes; Loc. 18f-1♂ paratype. All types in author's collection.

Discussion. *S. variabilis* sp. n. belongs to the group of *pubescens*, defined by Schmid (1969), and is closely related to *S. uncinata* Navas, occurring in S.E. China (Tonkin). Compared with that species (as figured by Schmid, 1949), the set of endosomal armature, as well as the most prominent latero-apical corners of segment 9th, appear as main distinctive features of the new species. *S. variabilis* sp. n. (males) is also characterized by the variability of the shape of the intermediate appendages, of the superior arms of inferior appendages, and of the number of spines in the endosoma. Female genitalia of *S. variabilis* sp. n. resemble mostly those of *S. bergeri* Martynov, although the differences in the length of vaginal vestibule and the shape of the semisclerotized structures in the distal portion of the vaginal chamber (cf. Figs. 16 and 17 with 22 and 23, respectively). The shape of the vulvar plate of the new species also resembles that of *S. marmorata*, but the shape of its vaginal vestibule and the absence of internal chitinized elements make it easily recognizable from the latter species. As to the fourth Korean representative of that genus, *S. coreana* Kuwayama, its female is the most individualized among all other ones (cf. Figs. 20, 21).

Stenopsyche coreana Kuwayama, 1930

This species has been often considered as *S. bergeri* Martynov (i. e. by Tsuda, 1942, and Schmid, 1965). Following that, Yoon (1988) does not include it in the list of S. Korean caddisflies.

Material examined. Loc. 9a—1♂; Loc. 9c—1♂; Loc. 29b—1♂; Loc. 29c—9♂, 15♀.

Female genitalia. Figs. 20, 21.

Distribution. Korea.

Stenopsyche bergeri Martynov, 1926

Material examined. Loc. 9a—3♂; Loc. 9c—1♂; Loc. 9f—1♂; Loc. 29b—5♂; Loc. 29c—11♂, 14♀.

Female genitalia. Figs. 22, 23.

Distribution. Korea, Far East of the USSR.

Family Psychomyiidae

Three species of the family were known in N. Korea so far, among them *Psychomyiella coreana* Tsuda being a probable endemic there (not represented in the material studied here). Instead, five other species are now added to the list, and three of them described as new to science.

Genus *Paduniella* Ulmer

The genus is new to Korea.

Paduniella amurensis Martynov, 1934

Material examined. Loc. 18c—1 ♂; Loc. 18h—14 ♂, 15 ♀.

Distribution. Korea, East Palearctic, India.

Paduniella martynovi sp. n.

Length of forewing, 3.4 mm. Colour (in alcohol) pale-brownish.

Male genitalia. Tergite 9th in dorsal aspect a broad and short triangle (Fig. 24). Superior appendages (i. e. "praeanal appendages" auct., "prolongements dorsaux du IXme segment" after Schmind (1958)) long, close to each other, in dorsal view much broader than in lateral aspect. Sternite 9th with its front dorsal corners projected orad. Shape of inferior appendages complicate: their proximal 1/3 broad, with one rectangular portion each, bearing a few, strong, setae; distal portion slender, apical 1/3 somewhat enlarged dorso-medially (Fig. 25); above the medio-basal corners a pair of internal lobes of inferior appendages, tapering in ventral view (Fig. 25), and rounded laterally. Aedeagus with membranous and enlarged apical portion, and with a strongly chitinized, needle-shaped paramere. A pair of also needlelike, slightly bent and nearly as long as paramere, internal processes (i. e. "épine supplémentaire" after Schmid, op. cit.) attached to the basis of aedeagus, each with a few, blunt spines near the base (Fig. 27). A pair of chitinous lateral strips connecting the base of internal processes and the proximal corners of tergite 8th (Fig. 26).

Material examined. Loc. 18b—Holotype male, and 1 ♀ (probably the same species, but not designated as paratype), in author's collection.

Derivatio nominis. This new *Paduniella* sp. is named after the eminent Russian entomologist Dr. Andrei Martynov, who has done so much in trichopteroLOGY during the first 1/3 of this century.

Discussion. *P. martynovi* sp. n. is closely related to the other species mentioned above, *P. amurensis*. These two species evidently co-inhabit in the potamal of River Daedong, Pyöngyang. They can be distinguished after the shape of some of their genitalic structures, male, as the tips of inferior appendages (bifurcate in *amurensis*), and the presence of internal lobes of these appendages in the new species.

Genus *Psychomyia* Latreille*Psychomyia forcipata* Martynov, 1934

Material examined. Loc. 18a—1 ♂; Loc. 29a—14 ♂, 6 ♀; Loc. 29b—10 ♂, 20 ♀; 29d—1 ♂; Loc. 29e—305 ♂, numerous (several thousands) ♀.

Distribution. Korea, Far East of the USSR.

Psychomyia uncatissima Botosaneanu, 1970

Material examined. Loc. 29d—1 ♂; Loc. 38—1 ♂.

Distribution. Korea (N.).

Genus *Psychomyiella* Ulmer*Psychomyiella minima* (Martynov, 1908)

Species new to Korea.

Material examined. Loc. 18a—66 ♂, 141 ♀; Loc. 27—1 ♂, 3 ♀; Loc. 29a—2 ♂; Loc. 29c—1 ♂, 1 ♀; Loc. 29e—107 ♂, numerous (more than one thousand) ♀.

Distribution. Korea, Eastern Palearctic.

Psychomyiella myohyangsanica sp. n.

Greatly variable in size; length of forewing, 3.3–4.5 mm. Colour (in alcohol) brownish, venation of forewings darker.

Male genitalia. Segment 8th short, its ventrodistal border forming a broad, rounded excision. Segment 9th with its sternal part only developed, well chitinized, almost entirely drawn into previous segments up to 7th, so, that only its distoventral portion with an angulate mid-cleft visible, together with the inferior appendages attached to it (Figs. 28, 30). Segment 10th semimembranous, narrow and elongated, terminating in a pair of small, digitate processes and praeapical setose "shoulders" (Fig. 29). A pair of long, heavily sclerotized (especially at tips) spine-like processes situated ventrolaterally, and very close to segment 10th; in lateral view, their basal halves S-formed and connected with the base of aedeagus (Fig. 28); these spines ("épines supplémentaires" sensu Schmid, 1958) correspond with the internal processes of *Paduniella martynovi* sp. n. mentioned above. Superior appendages very long, based as low as the mid of segment 8th; each one with its distal half divided into a ventro-lateral, hairy and parallel-sided portion, and one strongly sclerotized, bare, dorsoventrally flattened internal wing, easily visible both in ventral and lateral aspect. Viewed ventrally, each of the superior appendages forming an obtuse, dark mesal process, representing in fact the basalmost portion of above mentioned internal processes. Inferior appendages strongly reduced in length, but complicate in shape, each composed of two branches—thin and slightly recurved medial one, and strongly bent, hairy, lateral one. Aedeagus strongly sclerotized, sagittal-flattened (Fig. 30), laterally broad, terminating in a strong, vertical hook (Fig. 28).

Females probably presented in the material investigated, but so far I cannot find enough reason to

associate them with males.

Derivatio nominis. Myohyang-san = Myohyang Mts., where one of the typical localities (including the Holotype) of the new species is situated.

Material examined. Loc. 29a—Holotypes male, and 2♂ paratypes; Loc. 11—1♂ paratypes; Loc. 12—1♂ paratypes; Loc. 18a—4♂ paratypes; Loc. 18c—1♂ paratypes; Loc. 29e—470♂ paratypes, numerous (several thousands) females, not designated as paratypes. The type series in author's collection.

Discussion. The new species resembles the Japanese *P. acutipennis* Ulmer in the form of superior appendages and of segment 10th. These two species differ in the entirely otherwise shaped inferior appendages, as well as with the conspicuous pair of internal processes in male genitalia of *P. myohyangsanica* sp. n. The new species remarkable vary in size, one specimen from the river Daedong (Loc. 18c) with forewing length 3.3 mm only, while all the rest are with forewing length between 3.5 and 4.5 mm.

Psychomyiella cruciata sp. n.

Length of male forewing, 3.5–3.8 mm, that of the probable female, 3.6–4.0 mm. Colour (in alcohol) brownish. Somewhat smaller in size, otherwise habitually similar to *P. myohyangsanica* sp. n., but genitalia male entirely different.

Male genitalia. Segment 9th big, with its greater part drawn into segment 8th. Tenth segment, viewed dorsally, deeply divided by an obtuse median excision; each of the two parts with a broad basal portion, forming setose internal area, roughly shaped laterally, and a very long, suddenly tapering distal projection. Left and right projections slightly bent upwards, and much strongly mediad, so that their tips crossing each other. Inferior appendages each of two branches: basolateral one, slender and slightly undulated, and internal sophisticatedly shaped branch. The very basal portion of the later branch forming a pair of strong, dark hooks pointing down-and-orad; a second, also strongly recurved and acute processus, bearing several strong setae, situated not far from the base (Fig. 31). Distal portion of internal branches heavily chitinized, slender, sophisticatedly recurved so, that their tips (each one bearing a small additional subapical dent) crossed with the tips of the distal projections of segment 10th; as far as the midlength, these projections crossing each other, i. e. a X-like figure appears if viewed dorsoventrally (Figs. 32, 33). Aedeagus long, slender, well chitinized, straight dorsally (Fig. 34), strongly bowed laterally, its tip formed as a small but conspicuous hook (Fig. 31).

Females probably presented in the material investigated, but like those of *P. myohyangsanica* sp. n., left not treated so far.

Material examined. Loc. 29b—Holotype male, 2♂ paratypes and 8♀; Loc. 29c—1♂ paratype; Loc. 29e—6♂ paratypes. All these types in author's collection. Other three male paratypes (Myohyang Mts., 14–16.VI.1990, leg. H. Paepke) in collections of the Natural History Museum of the Humboldt University, Berlin, Germany.

Discussion. *P. cruciata* sp. n. could hardly be considered as been related with any other species of

genus *Psychomyiella* so far known. Its diagnostical features are numerous and, practically, concern all of the male genitalic details.

Family Ecnomidae

Genus *Ecnomus* McLachlan

Ecnomus tenellus (Rambur, 1842)

This largely distributed species was already reported both from N. Korea (Botosaneanu, 1970) and from S. Korea (Yoon, 1988).

Material examined. Loc. 1a—1 ♀; Loc. 18d—1 ♂, 5 ♀; Loc. 18i—3 ♂, 10 ♀; Loc. 18k—3 ♂, 5 ♀; Loc. 26—1 ♂.

Distribution. Palearctic, Ceylon, India, Taiwan.

Ecnomus yamashironis Tsuda, 1942

Material examined. Loc. 18c—4 ♂, 1 ♀; Loc. 18h—1 ♂, Loc. 18k—268 ♂, 81 ♀; Loc. 19d—1 ♀.

Males examined here are exactly corresponding to those figured by Botosaneanu (1970), and with small differences in comparison with the original description by Tsuda (1942). Nevertheless, I am inclined to consider the Japanese (Tsuda, op. cit.) and the Korean insects conspecific, the differences subjectively resulted.

Distribution. Korea, Japan.

Ecnomus tsudai sp. n.

Length of forewing (♂, ♀), 5.0–6.4 mm. Forewings with F₁. Habitually much resembling both *E. tenellus* and *E. yamashironis*.

Male genitalia. Superior appendages long, parallel-sided, their meso-apical surface with strong, dark spines; each appendage bearing a pale and slender, fingerlike baso-lateral processus; medio-basal portions of superior appendages pointed inwards and forming a pair of rough, stout processes, projecting below the base of the appendages (Fig. 35). Tergal portion of segment 9th narrow, sternal one big, with its upper margin angulately convex. Inferior appendages with their basal 1/2 broader than distal ones; the latter up-turned at a right angle (Fig. 35); viewed dorso-ventrally, their inner margins concave (Fig. 36). Aedeagus tapered, laterally high, suddenly acuminate at tip (Fig. 37); above its basal portion a pair of parallel, flattened, laterally capitate, heavily chitinized internal processes (Fig. 35).

Female genitalia presented on Figs. 38–40.

Material examined. Loc. 24—Holotype male; Loc. 19c—1 ♂ and 1 ♀ paratypes; Loc. 29b—1 ♀ paratype; Loc. 29c—1 ♂ paratype; Loc. 29e—4 ♀ paratypes. The whole type series in author's collection.

Discussion. *E. tsudai* sp. n. belongs to the phyletic line of *tenellus*, but apparently occupies a rather isolated position there. The most distinctive features of the new species are in the genitalia: form of inferior appendages and of aedeagus in male, as well as the general appearance of female genitalia.

Derivatio nominis. This new species is devoted to the memory of the well known Japanese entomologist, Prof. Matsune Tsuda, whose works on E. Palearctic Trichoptera are among the most important sources of corresponding knowledge from the first half of this century.

Family Polycentropodidae

Five species belonging to 3 genera have been known so far in Korea (N.), two of them not established in present study. Instead, 5 other species (two of them not specified) are newly reported. Thus, the number of the Korean polycentropodids is known so far 10 species.

Subfamily Pseudoneureclipsinae

Genus *Pseudoneureclipsis* Ulmer

Pseudoneureclipsis proxima Martynov, 1934

Species new to Korea.

Material examined. Loc. 29e—2 ♂, 4 ♀.

Botosaneanu (1970) reported from N. Korea *Pseudoneureclipsis ussuriensis* Martynov, expressing a need for further studies to confirm it. Together with this, the same author published (Botosaneanu, op. cit.) figures of male wings and the genitalia of both sexes. Taking in account the clear difference between *ussuriensis*, as figured in the original description (Martynov, 1934) and in Botosaneanu's paper on one hand, and *proxima* on the other, I think *P. ussuriensis* has been correctly reported from Korea.

Distribution. Far East of the USSR, Korea.

Subfamily Polycentropodinae

Genus *Plectrocnemia* Stephens

Plectrocnemia baculifera Botosaneanu, 1970

Material examined. Loc. 29c—1 ♂. This locality is the same (or in the same region at least) as the typical one, i. e. the species remains known only from the Mt. Myohyang-san.

Distribution. Korea.

***Plectrocnemia kusnezovi* Martynov, 1934**

Material examined. Loc. 29a—2 ♂; Loc. 29b—1 ♂. Like the case with the previous species, this locality repeats one of the stations already reported by Botosaneanu (1970).

Distribution. Korea, Far East of the USSR.

***Plectrocnemia wui* (Ulmer, 1932).**

Species new to Korea.

Material examined. Loc. 9a—1 ♂.

Distribution. Korea, Eastern China.

***Plectrocnemia* sp.**

Material examined. Loc. 24—1 ♀.

Females of all the above cited species are not/or scarcely known, thus the female of this species cannot be precised so far.

Genus *Nyctiophylax* Brauer

***Nyctiophylax angarensis* Martynov, 1910**

Species new to Korea.

Material examined. Loc. 29a—17 ♂, 10 ♀. Female genitalia of this species which was practically unknown, are shown on Figs. 42 and 43.

Distribution. Korea, USSR (Siberia, The Far East).

***Nyctiophylax hjangsanchonus* Botosaneanu, 1970**

Material examined. Loc. 29a—6 ♂, 1 ♀; Loc. 29b—2 ♀; Loc. 29e—13 ♂, 1 ♀. In fact, locality Nr. 29 is the same where this species has been described from, and only known so far. The female of *N. hjangsanchonus* was so far unknown, therefore although provisionally associated with males, its genitalia are shown on Figs. 44 and 45.

Distribution. Korea.

***Nyctiophylax* sp.**

Material examined. Loc. 29b—1 ♀.

This species, with its dark-brown colouration and big size (length of forewing, 7.5 mm), apparently differs from the two other representatives of that genus in Korea. The genitalia of this female, although remaining not specified, are presented on Figs. 46 and 47.

Family Hydropsychidae

This family, whose representatives dominate among caddisflies of the potamal, and are abundant in the hyporhithral as well, has been surprisingly poorly represented in the material investigated by Botosaneanu (197); only 6 species, most of them with a few, or even single specimens, are reported there. This figure is now nearly doubled. Taking in account also *Hydropsyche kawamurai* Tsuda (known only after the original description, but most probably a good species indeed), and the two other hydropsychids, *Diplectrona* sp. and *Cheumatopsyche brevilineata* (Iwata) reported from S. Korea (Yoon, 1988), the total list of Hydropsychidae from the Korean Peninsula amounts to 13 species belonging to 6 genera and 3 subfamilies respectively.

Subfamily Macronematinae

Genus *Macrostemum* McLachlan

Macrostemum radiatum (McLachlan, 1872)

Material examined. Loc. 18e—1 ♀ (cf. *radiatum*); Loc. 28—1 ♂; Loc. 29a—1 ♂; Loc. 29b—17 ♂, 4 ♀; Loc. 29c—19 ♂, 16 ♀; Loc. 29e—15 ♂, 3 ♀.

Distribution. Eastern Palearctic.

Genus *Aethaloptera* Brauer

An unnamed species of that genus has been reported from S. Korea recently (Yoon, 1988).

Aethaloptera rossica Martynov, 1910

Species new to Korea.

Material studied. Loc. 18f—1 ♂, 2 ♀.

Distribution. Korea, Eastern Palearctic.

Subfamily Hydropsychinae

Genus *Hydropsyche* Pictet

Hydropsyche dolosa Banks, 1939

Species new to Korea.

Material examined. Loc. 19b—3 ♂, 2 ♀.

Distribution. Korea, Northeastern China.

***Hydropsyche valvata* Martynov, 1927**

Material examined. Loc. 29b—1 ♂; Loc. 29e—1 ♂.

Distribution. Eastern Palearctic.

***Hydropsyche orientalis* Martynov 1934**

Material examined. Loc. 9a—21 ♂; Loc. 9f—2 ♂; Loc. 29a—1 ♂; Loc. 29b—2 ♂; Loc. 29e—1 ♂. These males have been collected at light and in most of the cases together with numerous females which can hardly be associated to this species. Thus, the females are left unspecified here.

Distribution. Korea, Far East of the USSR, Japan.

***Hydropsyche kozhantschikovi* Martynov, 1924**

Material examined. Loc. 1c—4 ♂, 9 ♀; Loc. 8b—14 ♂, 52 ♀; Loc. 9a—2 ♂,; Loc. 9f—1 ♂; Loc. 18a—3 ♂, 24 ♀; Loc. 18h—1 ♂; Loc. 18k—1 ♂, 1 ♀; Loc. 29a—2 ♂, 2 ♀; Loc. 29c—1 ♂; Loc. 29e—12 ♂, numerous ♀.

This is seemingly the most common *Hydropsyche* species in Korea.

Distribution. Eastern Palearctic.

***Hydropsyche nevae* Kolenati, 1858**

Recently reported from the northernmost Korean province of Ryangang (Mey, 1989).

Material examined. Loc. 29a—1 ♂; Loc. 29c—5 ♂; Loc. 29e—2 ♂.

Distribution. Palearctic.

Genus *Cheumatopsyche* Wallengren

***Cheumatopsyche infascia* Martynov, 1934**

Material examined. Loc. 1c—3 ♂, 7 ♀; Loc. 2b—1 ♂; Loc. 3—2 ♂, 1 ♀; Loc. 8a—1 ♂; Loc. 8b—3 ♂, 1 ♀; Loc. 9a—1 ♂; Loc. 9c—4 ♂, 3 ♀; Loc. 10—1 ♂, 3 ♀; Loc. 17a—18 ♂, 11 ♀; Loc. 18k—1 ♂, 1 ♀; Loc. 24—5 ♂, 12 ♀; Loc. 29a—17 ♂, 16 ♀; Loc. 29b—93 ♂, 25 ♀; Loc. 29c—126 ♂, 47 ♀; Loc. 29e—2 ♂, 12 ♀.

This species is one of the most common hydropsychids in Korean Peninsula.

Distribution. Korea, Far East of the USSR.

***Cheumatopsyche albofasciata* (McLachlan, 1872)**

Material examined. Loc. 18k—1 ♂; Loc. 29a—1 ♂, 2 ♀; Loc. 29b—2 ♂; Loc. 29c—25 ♂, 12 ♀; Loc. 29d—4 ♀; Loc. 29e—156 ♂, 227 ♀.

Although rather conspicuous in its forewing's colour pattern, this species has been rarely mentioned in the previous literatures. The genitalia of male (Figs. 49–51), however, is almost similar to those of *C. infascia*. Thus, the clearly bicolored forewings, where F_1 is also developed (Fig. 48), appear as a main diagnostic feature of *Cheumatopsyche albofasciata*. Mey (1989) has reported it from the Mt. Myohyang-san. (where our locality Nr. 29 is situated).

Distribution. Korea, Eastern Palearctic, Taiwan.

Genus *Potamyia* Banks

Potamyia czekanowskii (Martynov, 1910)

Material examined. Loc. 18a–58 ♂, 34 ♀; Loc. 18b–30 ♂, 10 ♀; Loc. 18f–57 ♂, 48 ♀; Loc. 18h–3 ♂, 3 ♀; Loc. 19b–3 ♀; Loc. 29c–6 ♂, 56 ♀; Loc. 29e–110 ♂, ca. 10000 ♀.

The most distinctive feature of this species, as well as of the following one, is the presence of a long row of short, dense and dark setae along the costal margin of female forewings (male individuals absolutely lacking in this row!). In fact, this feature has been mentioned by Martynov (1934), but without a special stress on the lack of such a row in the male forewings. While the male genitalia of this species (Figs. 52–54) clearly differ from the ones of *P. chinensis* (Ulmer), the females of both species can be distinguished mainly after the colour; lighter, yellowish in *P. czekanowskii*, and darker, smoky brownish in the other species.

Distribution. Korea, Eastern Palearctic.

Potamyia chinensis (Ulmer, 1915), nec Martynov, 1930

Species new to Korea.

Material examined. Loc. 1a–1 ♂; Loc. 28–1 ♀; Loc. 29a–5 ♀; Loc. 29c–2 ♂, 7 ♀; Loc. 29e–12 ♂, ca. 3700 ♀.

As it was mentioned in the previous species, females darker (wings smoky brownish) than those of *Ch. czekanowskii*, otherwise with the same row of dark, short setae along the costal margin of forewing.

Distribution. Korea, Eastern Palearctic.

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북한産 날도래目的 분류 Ⅲ. 줄날도래上科

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북한지역에서 채집조사된 줄날도래上科는 총 6科 39種이 분류동정되었다. 그중 Philopotamidae 科의 2種, 〈*Warmaldia coreana* sp. nov., *W. longicera* sp. nov.〉, Stenopsychidae과의 1種 〈*Stenopsyche variavilis* sp. nov.〉, Psychomyiidae科의 3種 〈*Paduniella martynovi* sp. nov., *Psychomyiella myohyangsanica* sp. nov., *P. cruciata* sp. nov.〉 그리고 Ecnomidae科의 1種 〈*Ecnomus tsudai* sp. nov.〉 등 7종을 신종으로 기재, 발표하며, 10종의 未記錄種과 *Paduniella*屬이 한반도에서는 처음으로 보고된다. 또한 처음으로 *Stenopsyche marmorata* Navas등 9종의 암수컷 생식기를 관찰, 도해하였다.

검색어: 날도래목, 줄날도래상과, 분류, 한국.

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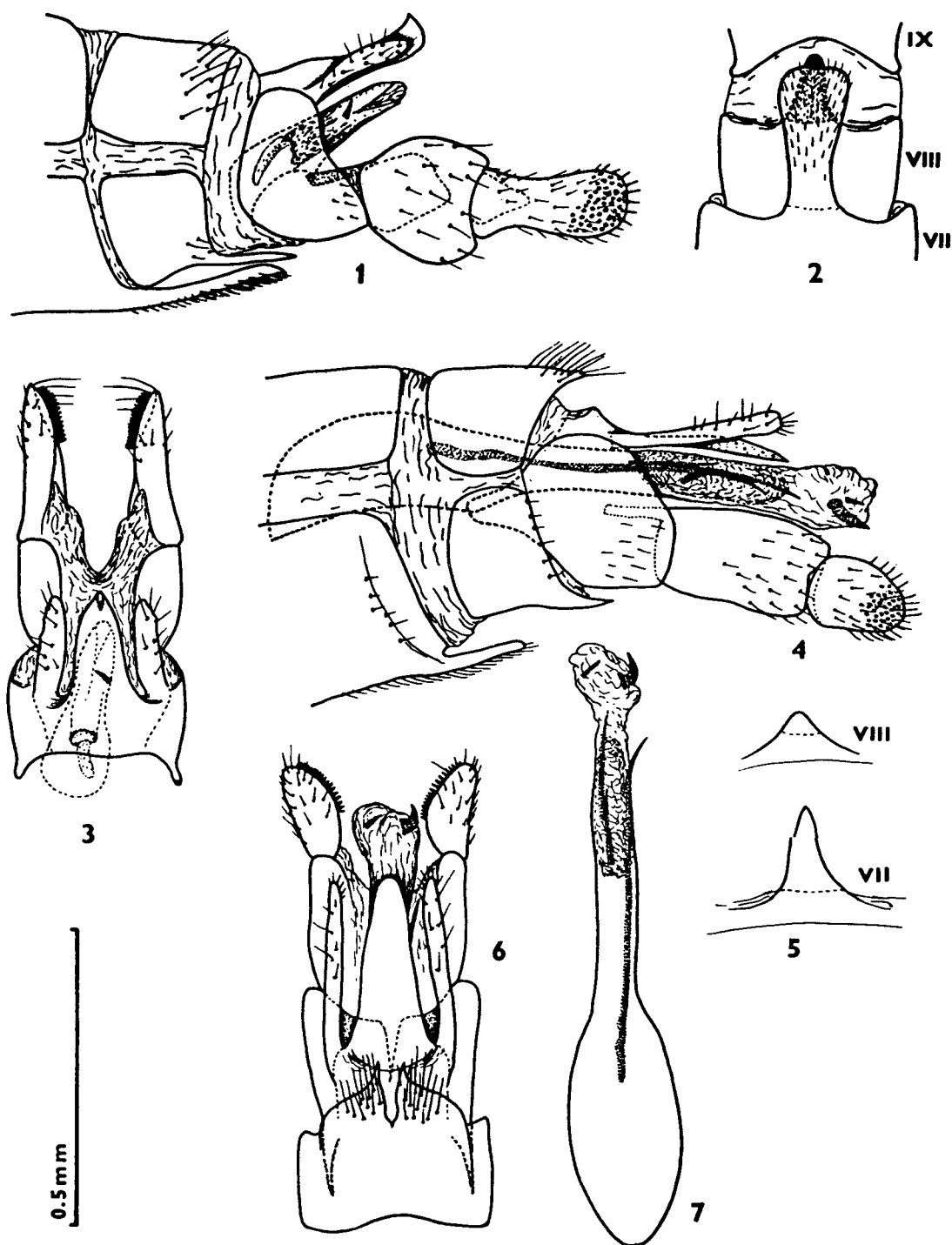


Fig. 1—7. *Wormaldia* (W.) *coreana* sp. n. and *Wormaldia* (W.) *longicerca* sp. n., male genitalia : *W.* (W.) *coreana* sp. n.; 1—lateral, 2—segments VII—IX, ventral, 3—dorsal. *W.* (W.) *longicerca* sp. n.; 4—lateral, 5—mesal processes of sternites VII and VIII, 6—dorsal, 7—
aedeagus, dorsal

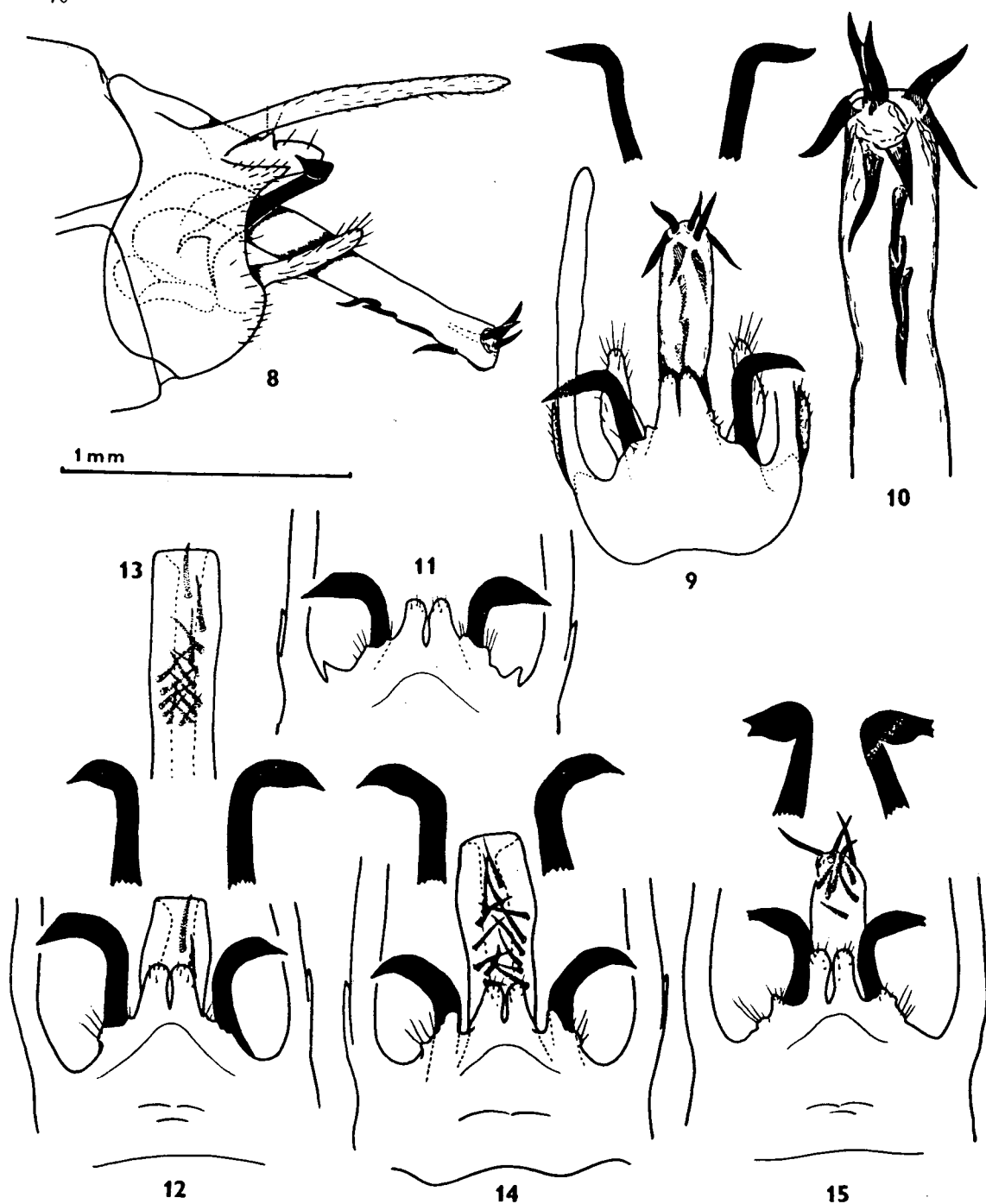


Fig. 8-15. *Stenopsyche variabilis* sp. n., male genitalia : 8-lateral, 9-dorsal (above-superior arms of inferior appendages, ventro-caudal), 10-aedeagus, ventral (strongly magnified), 11-genitalia of another specimen, dorsal (aedeagus omitted), 12-the same of a third specimen (above-superior arms of inferior appendages, ventro-caudal), 13-aedeagus of the latter, dorsal, 14-the same of a fourth specimen, 15-the same of a fifth specimen

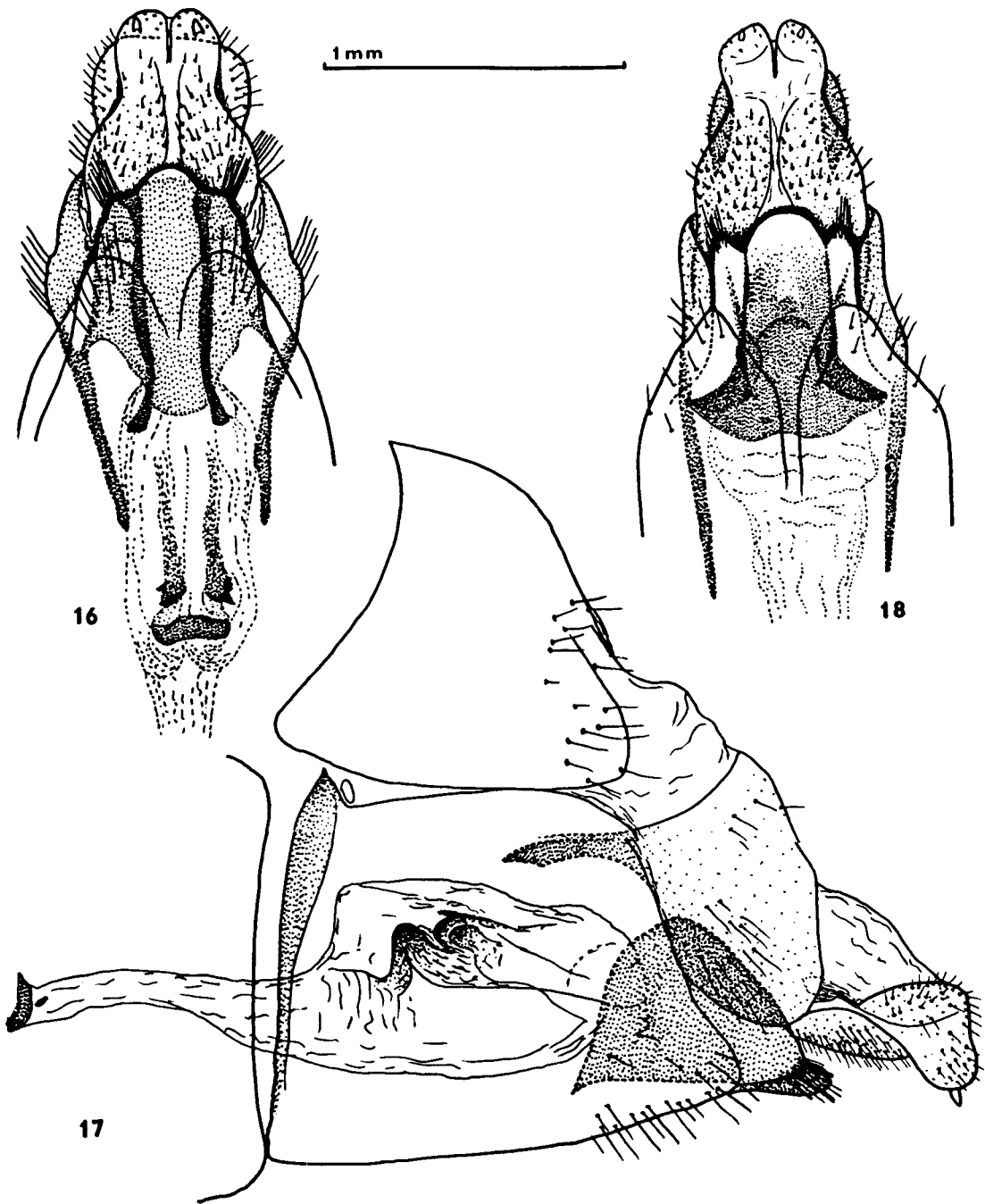


Fig. 16–18. *Stenopsyche* spp., female genitalia : *St. variabilis* sp. n.; 16–ventral, 17–lateral. *St. marmorata* Nav., 18–ventral.

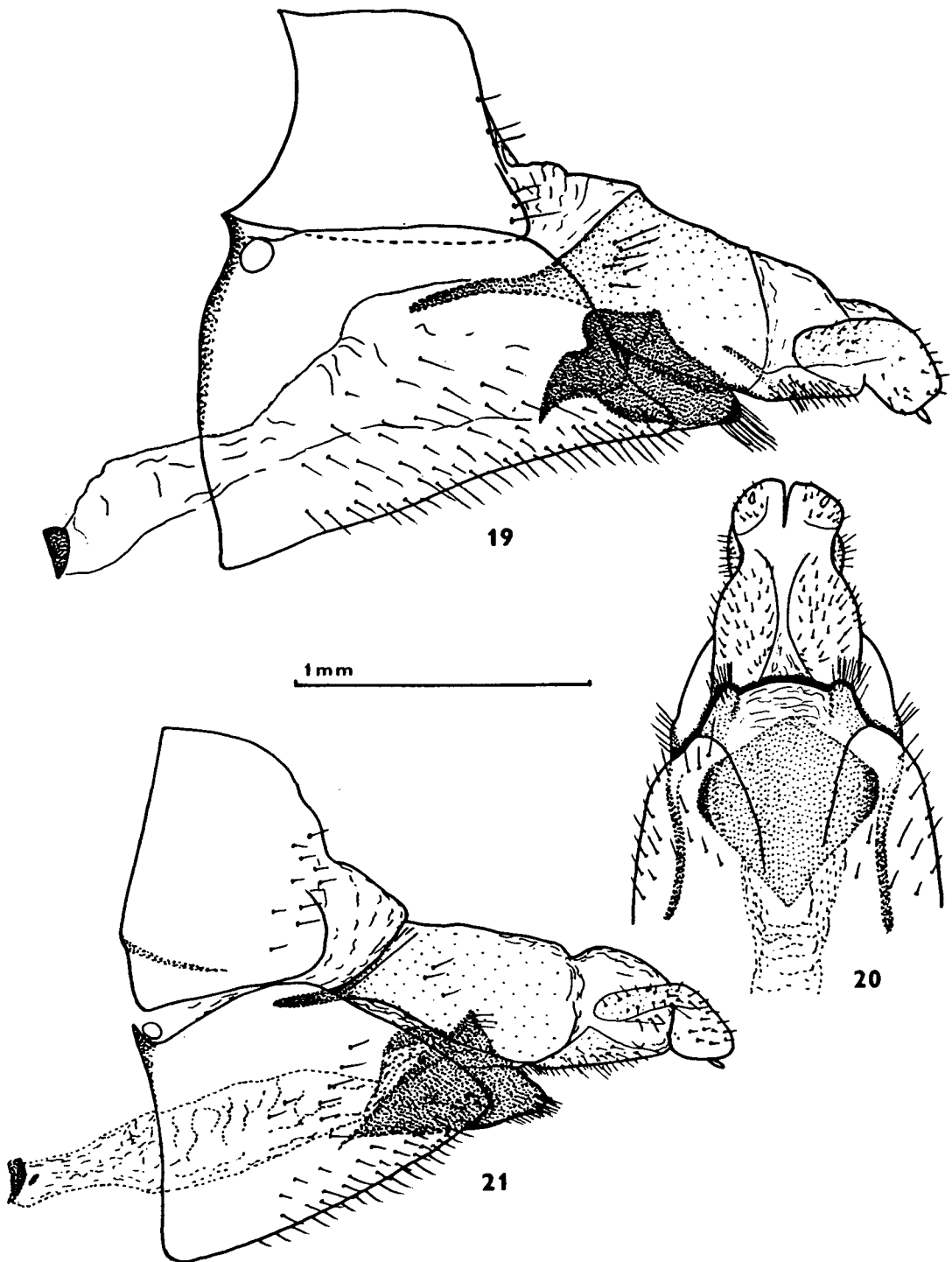


Fig. 19–21. *Stenopsyche* spp., female genitalia : *St. marmorata* Nav.; 19—lateral. *St. coreana* Kuw.; 20—ventral, 21—lateral.

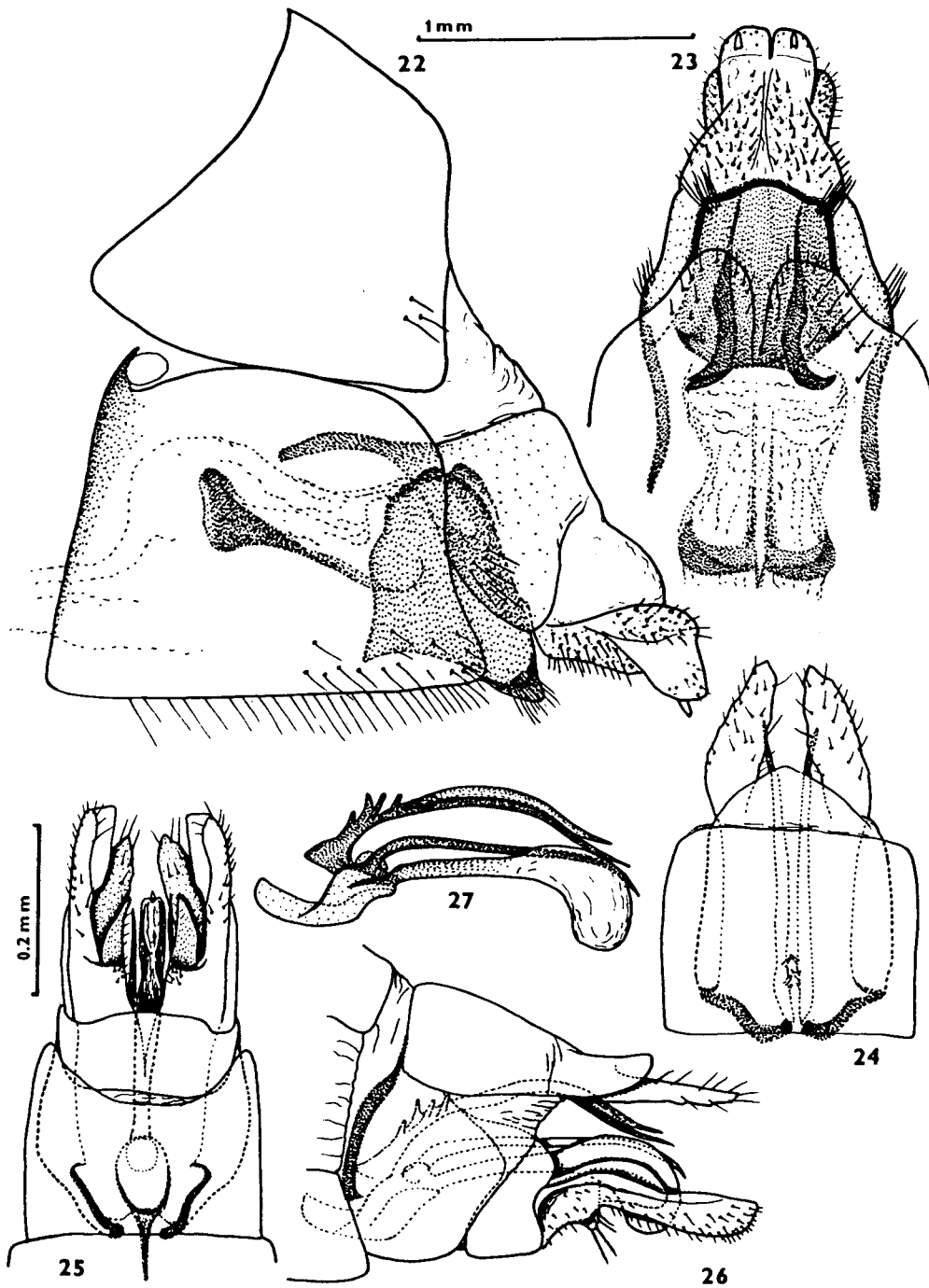


Fig. 22–27. Genitalia of *Stenopsyche bergeri* Mart. and *Paduniella martynovi* sp. n. : *St. bergeri* Mart., female; 22—lateral, 23—ventral. *P. martynovi* sp. n., male; 24—dorsal, 25—ventral, 26—lateral, 27—internal additional processes, lateral.

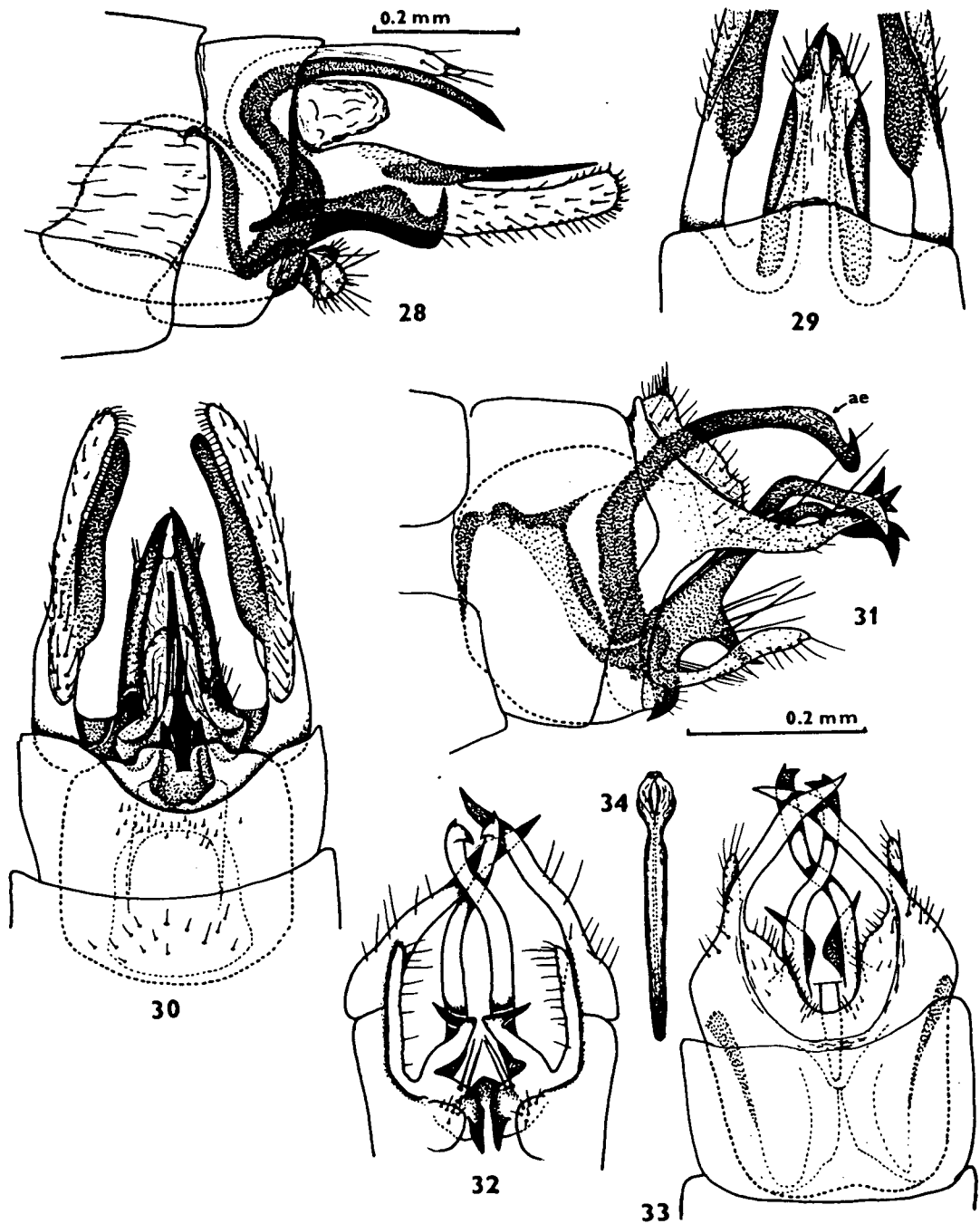


Fig. 28—34. *Psychomyiella myohyangsanica* sp. n. and *Psychomyiella cruciata* sp. n., male genitalia : *Ps. myohyangsanica* sp. n.; 28—lateral, 29—dorsal, 30—ventral. *Ps. cruciata* sp. n.; 31—lateral, 32—ventral (aedeagus omitted), 33—dorsal (aedeagus omitted), 34— aedeagus, dorsal.

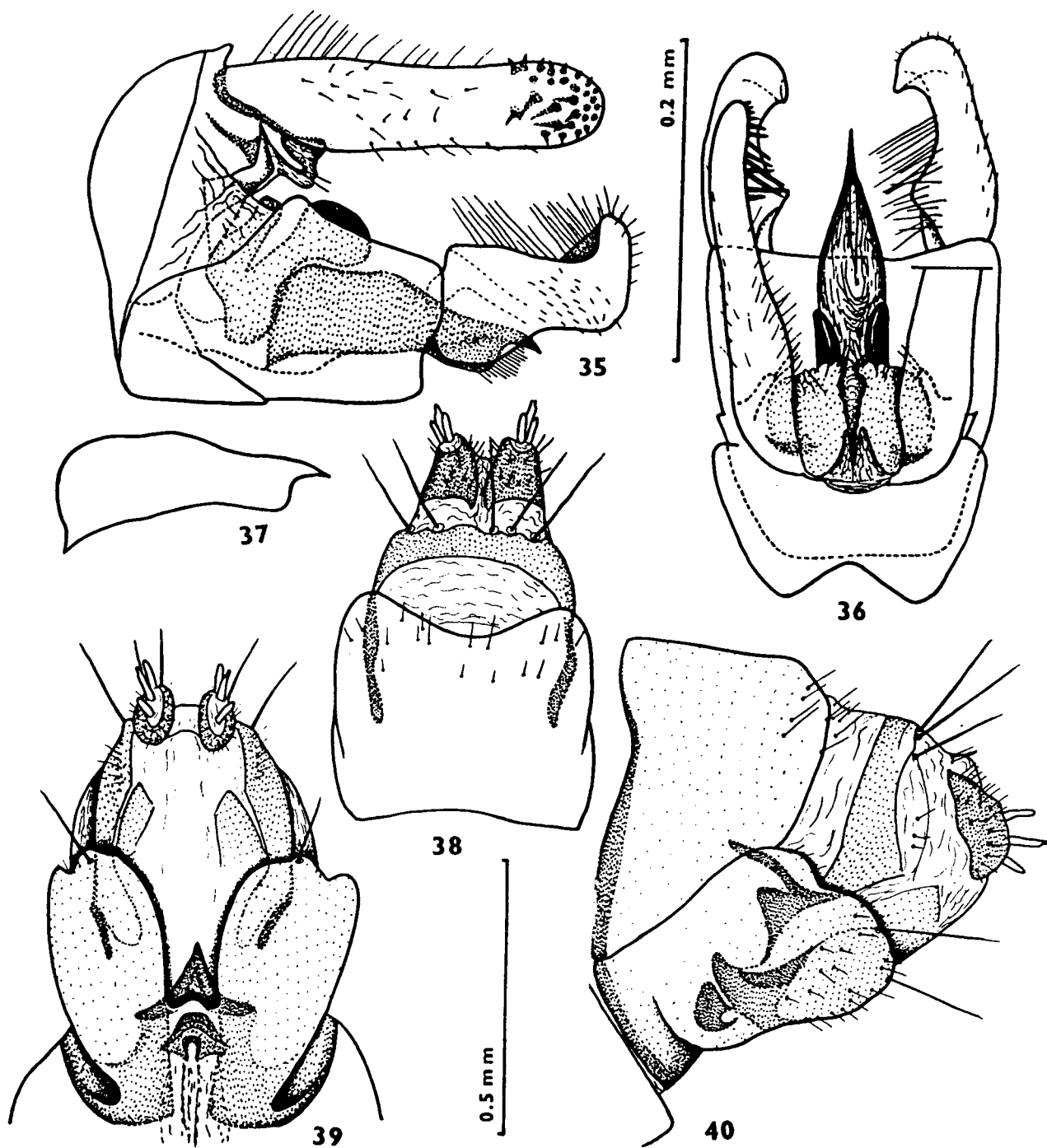


Fig. 35–40. *Ecnomus tsudai* sp. n. : Male; 35–lateral, 36–dorsal, 37–aedeagus, lateral. Female; 38–dorsal, 39–ventral, 40–lateral.

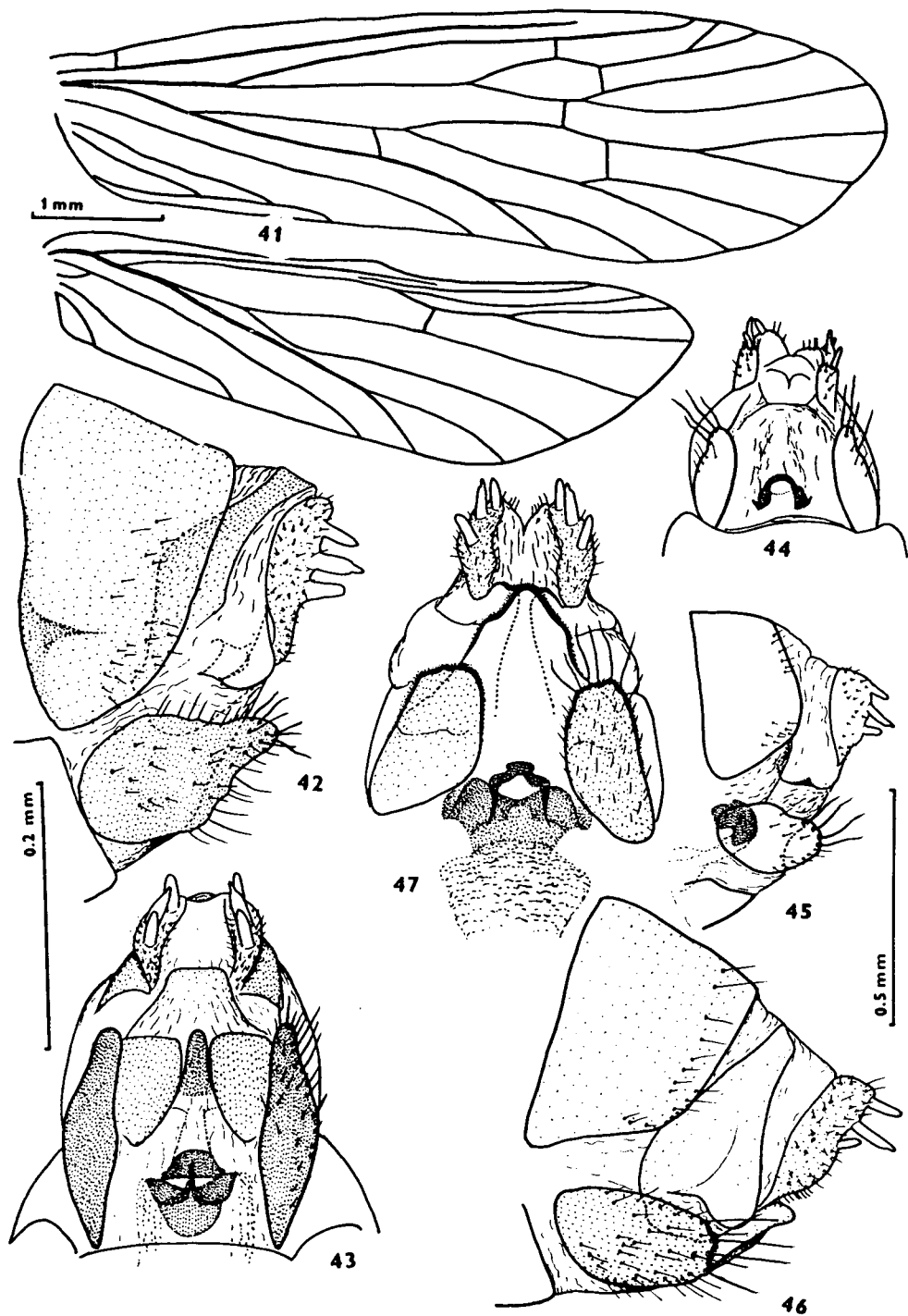


Fig. 41–47. Females of *Ecnomus tsudai* sp. n. and *Nyctiophylax* spp.: *E. tsudai* sp. n.; 41—venation of wings. *N. angarensis* Mart.; 42—genitalia, lateral, 43—the same, ventral. *N. hjangsanichonus* Bots.; 44—genitalia, ventral, 45—the same, lateral. *Nyctiophylax* sp.; 46—genitalia, lateral, 47—the same, ventral.

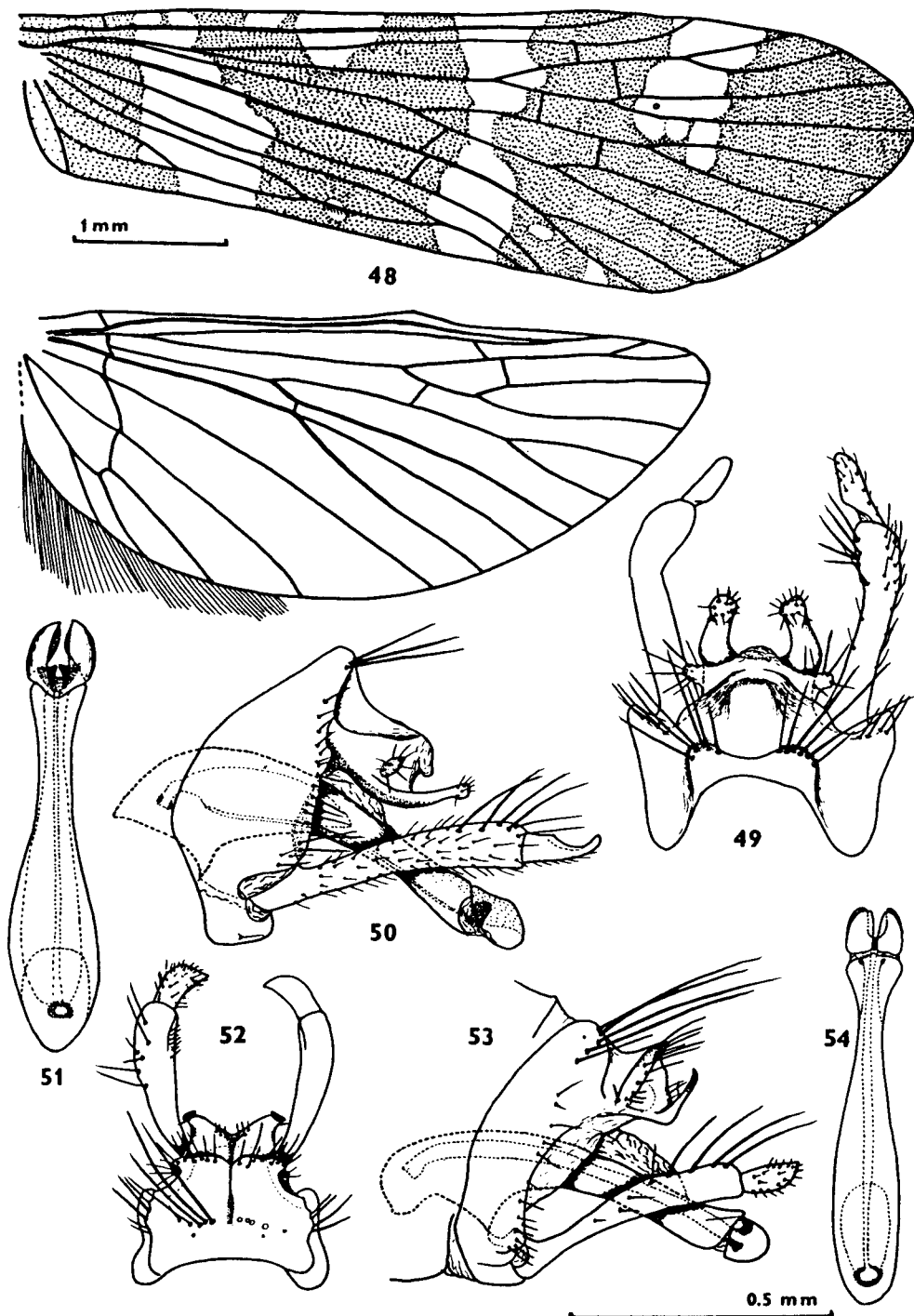


Fig. 48–54. Males of *Cheumatopsyche albofasciata* (McL.) and *Potamyia czezanowskii* (Mart.) : *Ch. albofasciata* (McL.); 48—front (above) and hind (below) wing, 49—genitalia (aedeagus omitted), dorsal, 50—genitalia, lateral, 51— aedeagus, dorsal. *P. czezanowskii* (Mart.); 52—genitalia (aedeagus omitted), dorsal, 53—genitalia, lateral, 54— aedeagus, dorsal.